

Utilization of Tongkah in the Productivity of Shellfish Fishermen in Tembeling Village, Bintan Regency

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Article History:

Received on 13 November 2025
1st Revised on 21 November 2025
2nd Revised on 08 December 2025
3rd Revised on 01 January 2026
Accepted on 16 February 2026

Abstract

Purpose: This study analyzes the tongkah, a traditional sliding board, to enhance shellfish fishermen productivity in Tembeling Village, Bintan Regency.

Methodology/approach: This study employed a qualitative case study approach conducted in Tembeling Village, Riau Islands, Indonesia. Data were collected through participatory observation, in-depth interviews, and documentation involving shellfish fishermen and key community informants selected through purposive sampling methods.

Results/findings: The findings show that tongkah increases fishermen's productivity by reducing operational costs, shortening harvesting time, and expanding access to fishing areas that small boats cannot reach during low tide. In addition to its economic benefits, tongkah reflects local wisdom by strengthening cultural identity, social solidarity, and intergenerational knowledge transfer. Sustainability challenges include the limited availability of pulai wood, environmental change, extreme weather, and potential coastal development policies.

Conclusions: The use of tongkah enhances the productivity of shellfish fishermen in Tembeling through improved efficiency and spatial access, while simultaneously supporting sociocultural values. Long-term sustainability requires adaptive innovation and supportive coastal management policy.

Limitations: The study is limited to a single village, uses a qualitative descriptive method without quantitative productivity measures, and may be subject to subjective bias despite triangulation. External factors, such as coastal policies and climate change, were not examined in depth.

Contributions: This study provides empirical evidence that traditional tools can bolster the livelihoods of small-scale coastal fishers and links tongkah use to productivity within frameworks such as Sustainable Livelihoods and cultural economics, informing fisheries science, coastal economics, and resource management.

Keywords: *Coastal Tradition, Fishermen Productivity, Local Wisdom, Sustainability, Tongkah*

How to Cite: Nurhasanah, N., Juang, B. S., Ikhsan, F. M., Tusaqdiah, M., Tasya, Z., Mayori, L. A. (2026). Utilization of Tongkah in the Productivity of Shellfish Fishermen in Tembeling Village, Bintan Regency. *Studi Ilmu Manajemen dan Organisasi*, 7(1) 301-311.

1. Introduction

Indonesia, as an archipelagic country, has a wealth of marine resources that are the basis of the lives of coastal communities. Marine products such as shellfish, sea snails, and other mollusc organisms are important livelihoods that have the potential to make a significant contribution to the income of coastal communities. However, in practice, the productivity of shellfish fishermen still faces various

limitations, especially in relation to access to technology, environmental conditions, and traditional work methods ([Alahmed, 2017](#)).

Tembeling Village, Bintan Regency, is a coastal area that actively utilizes marine resources, with barking snails (*Strombus* sp.) as the main commodity. Based on the village population data, the number of fishermen in Tembeling Village is approximately 60, most of whom depend on coastal resources. In this context, local communities develop adaptive practices known as *Snoop Dogg*, a shellfish search activity using a tongkah board as an aid when the sea water recedes. This practice not only serves as an economic activity but also reflects local wisdom inherited from generation to generation ([Lestari, Adi, & Jufri, 2025](#)) and ([Yektyastuti, Muzzazinah, Erlangga, & Usgianti, 2024](#)).

Empirical findings show that *Snoop Dogg* has integrated with the value system and norms of the Sea Tribe community. In addition to increasing family income, this practice also plays a role in preserving the environment through the application of customary rules and local taboos ([Nurmalasari, 2023](#)). Operationally, the *Snoop Dogg* is generally done for 3-4 hours every day and is adjusted to the tidal conditions of the seawater. This work pattern shows the existence of an adaptation system that has the potential to increase the efficiency of fishermen's working time.

Previous research on the habitus of the Sea Tribe has shown that *Snoop Dogg* uses a tongkah board, which is generally made of island wood and is used regularly at low tide ([Dewanti et al., 2023](#)). [Nurhasanah \(2024\)](#) emphasizes that this tradition not only functions as an economic strategy but also contains strong environmental preservation values through local wisdom that is still maintained by coastal communities.

The urgency of this research is based on empirical findings that show that work efficiency and work facilities are important factors in determining the productivity of fishermen. ([Nurhasanah, 2024](#)) found that skills and work facilities positively affect fishermen's productivity. The findings are reinforced by [Akbar, Wahju, and Riyanto \(2023\)](#) and [Yonvitner, Boer, and Kurnia \(2020\)](#) which emphasizes that the effectiveness of fishing gear is closely related to increasing catches and fisheries sustainability. International studies by [Bai, Han, and Ikebe \(2023\)](#) also show that traditional fishing gear can make a real contribution to the productivity of fishing communities.

In the context of fisheries, productivity is understood as a form of adaptation to the work environment ([Cresswell, 2013](#)). The use of the tongkah as a simple tool allows fishermen to work more efficiently and safely in shallow, muddy waters. [Asmaul Husnah Asrum and Morkoyunlu \(2025\)](#) state that traditional tools reflect the resilience and cultural values of coastal communities. [Aula, Umar, and Hafizrianda \(2024\)](#) also shows that the adoption of traditional fishing gear through community interaction can speed up the search process and increase productivity.

Based on the Theory of Human Capital [Pyatt \(1966\)](#), the use of tongkah also increases the skill and confidence of fishermen. In addition, [Scoones \(1998\)](#) emphasized that community-based practices such as *Snoop Dogg* contribute to strengthening social solidarity and community empowerment ([Ferrer et al., 2021](#)). Through the *Sustainable Livelihoods Framework*, tongkah can be seen as a physical and social asset that supports sustainable livelihoods, in line with [Fao \(2018\)](#) view on the importance of traditional fishing gear in maintaining a balance between productivity and sustainability of the marine environment.

However, a clear research gap exists. Most previous studies have focused on socio-cultural aspects and the preservation of local wisdom, while empirical studies that specifically analyze the effect of the use of tongkah on increasing the work productivity of shellfish fishermen are still limited, especially in areas such as Tembeling Village. Research on small-scale fishing gear innovation [Ferrer et al. \(2021\)](#) alludes to traditional efficiency, but it has not been deeply linked to the indicators of fishermen's micro-economic productivity.

Therefore, this study aims to fill this gap by empirically analyzing the use of tongkah in increasing the work productivity of fishermen looking for sea shellfish in Tembeling Village, Bintan Regency, Riau Islands. This research not only highlights economic efficiency but also considers aspects of the social and ecological sustainability of coastal communities.

2. Literature Review

As a maritime country, Indonesia, which has the second longest coastline in the world, has massive coastal fishery resource potential. However, this potential is overshadowed by the chronic challenges in the small-scale fisheries sector, particularly those related to the productivity and welfare of fishermen ([Mahpudin et al., 2026](#)). Several studies have consistently highlighted that the low work efficiency of fishermen is often influenced by fundamental limitations, namely, the limitations of modern fishing gear, the low adoption of relevant technology, and the lack of innovation based on relevant local wisdom ([Syukri, Lestari, & Susiana, 2020](#)).

Previous research has shown that the application of traditional aids can increase productivity without harming the environment. [Salmiah \(2021\)](#) affirms that the traditional Snoop Dogg by the Sea Tribe community plays a role in increasing family economic income and preserving the coastal environment through customary rules and local taboos. Meanwhile, [Bai et al. \(2023\)](#), in a study in Japan, found that the use of traditional fishing gear has high cultural value and directly increases the productivity of fishermen by strengthening community identity.

From a resource management perspective, the operational effectiveness of fishermen is highly dependent on infrastructure and on human capital. [Nurhasanah \(2024\)](#) empirically it has been found that adequate facilities and work skills significantly influence productivity increases, especially in communities with coastal economies. Furthermore, [Akbar et al. \(2023\)](#) emphasized that the effectiveness of fishing gear is the main determinant that affects the level of catch, which is directly correlated with fishermen's income. In a broader framework, [Fitriyah and Ansori \(2022\)](#) stipulate that the effectiveness of fisheries should be the main indicator for measuring the sustainability of marine resource management. In the face of these challenges, adaptive and location-specific traditional fishing gear, such as the tongkah used by shellfish hunters, has emerged as an important solution. Tongkah represents local innovation that is not only economically efficient but also aligned with the principles of ecological and social sustainability.

From the perspective of social empowerment, [Bagindo, Herwandi, Chaniago, and Saga \(2023\)](#) affirmed that traditional fishing rights and gear systems contribute to improving the welfare and independence of coastal communities. These findings are reinforced that technological adaptation based on local wisdom can strengthen the economic and social resilience of the fishing community in Indonesia. A similar approach was observed in a study [Sitorus and Fatkhullah \(2022\)](#) that emphasized the importance of marine resources in supporting national food security through the productivity and sustainability of coastal ecosystems.

From the perspective of economic efficiency, the relevance of traditional tools in supporting productivity has been proven in various contexts. Research shows that the application of traditional aids can increase catch without causing serious environmental degradation. In the study of economic efficiency, [Hapsari \(2022\)](#) Finding that fishermen who are able to effectively manage time, effort, and costs contribute directly to increased productivity. [Rahmansyah, Hudzafidah, Masluha, and Junaidi \(2024\)](#) It is important to note that the use of simple technology based on tradition has been proven to be able to speed up the production process while reducing high operational costs, despite being faced with limited capital and tools.

The use of sticks can be specifically analyzed as a simple technology adaptation strategy oriented towards increasing output per unit of input (power and time). As a tool designed to maneuver in tidal mud, the tongkah allows shellfish finder fishermen to reach hard-to-reach catch locations, minimizing

fatigue and maximizing the duration of catch time at optimal locations. Thus, the tongkah increases the physical leverage of fishermen.

In this study, tongkah serves as a key variable that is studied to the extent to which it affects the microeconomic productivity of fishermen (e.g., catch per hour/per day and net income) in Tembeling Village. This directly tests the hypothesis that the efficiencies generated by traditional tools can overcome the limitations faced by small-scale fishers.

Described that Snoop Dogg has developed into a cultural symbol and part of the identity of the Duano Tribe community in Indragiri Hilir. This activity shows a transformation of traditional cultural and economic livelihood activities. This view is in line with the concept of the Sustainable Livelihoods Framework [Scoones \(1998\)](#), which places traditional tools such as São Paulo as a physical and social asset in supporting sustainable livelihoods. This view is supported by [Bai et al. \(2023\)](#), who found that traditional fishing gear has high cultural value and helps increase productivity by strengthening the identity and social cohesion of the community among Japanese fishermen.

Socio-ecologically, [Salmiah \(2021\)](#) underlining the role of the menongkah tradition by the Sea Tribe community, which not only increases economic income but also maintains the preservation of the coastal environment through customary rules, taboo laws, and community-based resource management. From an empowerment perspective, [Aula et al. \(2024\)](#) emphasized that the tradition-based fishing rights system contributes significantly to improving the welfare and independence of coastal communities. In Indonesia, technological adaptation based on local wisdom, as stated by [Zulkifli, Manurung, and Agustrisno \(2022\)](#), strengthens the economic and social resilience of the fishing community. The importance of this ecological linkage is also emphasized by [Syukri et al. \(2020\)](#), who stated that the use of bark snails in Tembeling is highly dependent on the understanding of coastal ecology and the local wisdom of the local community.

Tongkah and its accompanying catch system can be analyzed using the Sustainable Livelihoods Framework (SLF) ([Scoones, 1998](#)). In this framework, tongkah is not only seen as a physical asset (tool) but also as a social asset that preserves local wisdom and supports sustainable livelihood for the community. [Merdekawati and Sofyan \(2025\)](#) added that marine resources, which are managed sustainably through this practice, are important for supporting national food security.

To provide a strong theoretical foundation, this study utilizes the Human Capital Theory ([Pyatt, 1966](#)). Within this framework, the use of an ingrained tool such as the tongkah not only increases physical efficiency, but also acts as a catalyst for the improvement of specific skills, confidence, and social solidarity (in line with the concept of empowerment ([Cresswell, 2013](#))). Improving the quality of human capital ultimately strengthens the competitiveness of traditional fishermen amidst modernization. This proves that modernization does not always mean abandoning tradition but can instead synergize between local innovation and human resource capacity building to achieve prosperity and sustainability.

3. Research Methodology

This research uses a qualitative method with a descriptive approach because it is considered the most relevant to explore the meaning, understanding, and experience of fishermen looking for sea shellfish using tongkah as a traditional tool. This approach is also in line with previous studies that emphasize the importance of understanding the socioeconomic dynamics of fishermen in relation to productivity and welfare ([Rahmansyah et al., 2024](#)).

The research was conducted in Tembeling Village, Bintan Regency, Riau Islands. The subjects of the study include fishermen looking for sea shellfish who use tongkah, local community leaders, representatives of fishermen's families, and village officials who understand the practice of menongkah. The determination of informants is carried out by the purposive sampling technique so that researchers can reach individuals who have in-depth knowledge of the research ([Syukri et al., 2020](#)). This strategy

was chosen because the use of tongkah is not only related to economic activities but also concerns cultural aspects that are still maintained from generation to generation ([Suganda, 2025](#)).

The subject of this study was designed to cover the entire spectrum of relevant information, from fishermen using tongkah to village stakeholders. The determination of key informants was carried out using purposive sampling techniques, ensuring that researchers could reach individuals with in-depth knowledge (key informants) and direct experience of research phenomena ([Yonvitner et al., 2020](#)). This strategy was chosen because the use of tongkah is not only an economic activity, but is also closely related to cultural aspects and the sustainability of resources that are protected from generation to generation. To guarantee transpan ([Asmaul Husnah Asrum & Morkoyunlu, 2025](#)). Methodological ration, this study involved three (3) shellfish fishermen who acted as key informants. The three informants were male residents of Tembeling Village, in their male, with their main profession as fishermen looking for sea shells, and are in their 40s, so they had accumulated experience and rich historical perspectives regarding the effectiveness and challenges of using sticks.

Data collection techniques included participatory observation, in-depth interviews, and documentation. The combination of these three techniques is important for improving data accuracy through triangulation ([Rahmansyah et al., 2024](#)). Data analysis was conducted using a qualitative descriptive approach through the stages of data reduction, data presentation, and conclusion drawing ([Merdekawati & Sofyan, 2025](#)). To maintain the validity of the data, the sources and methods are triangulated techniques, member checks to informants, and peer discussions to reduce the potential for researcher bias ([Salmiah, 2021](#)).

4. Results and Discussion

This research was conducted in Tembeling Village, Bintan Regency, which is known as one of the coastal areas with a fairly high level of traditional fishing activity. The village has geographical characteristics in the form of shallow waters with muddy seabed conditions, which form a unique ecological system and influence how local communities carry out economic activities. Most residents of Tembeling Village depend on marine products such as shellfish, shrimp, bark, and mangrove crabs for their livelihood. For them, the sea is not only an economic source but also part of the social and cultural identity inherent in daily life.

The findings indicate that tongkahs function as a primary physical asset that enables fishermen to access fishing areas that cannot be reached by motorized boats. This tool is generally constructed from a single solid piece of wood or several wooden planks joined together. The materials commonly used include jelutung wood, pulai wood, and other similar types of timber. This function directly enhances fishermen's productivity, particularly in the shallow and muddy waters of Tembeling Village. The use of tongkah facilitates shellfish collection and serves as a protective tool by reducing the risk of injury from marine organisms, such as stinging sea creatures encountered in muddy coastal areas ([Syafitri, 2022](#)).

Tongkah is a local solution born from the local wisdom of the community in understanding the characteristics of its coastal environment. The use of this tool shows that increasing the productivity of fishermen does not always depend on the adoption of modern technology but on the suitability of the tools with local ecological characteristics. Tongkah allows fishermen to minimize operational costs while maximizing the range of fishing space, so that productivity is understood as a result of adapting local technology to the work environment of the fishermen.

4.1 Forms and Techniques of Tongkah Utilization

The interview results show that tongkah is used by almost all fishermen in Tembeling Village, both men and women, to search for various types of marine life. According to the information of one of the informants, Mr. Nazar, tongkah is used to look for mangrove crabs, bark, shrimp, and shellfish. Female participation, especially among mothers, tends to take place during nocturnal low-tide periods, whereas daytime activities are primarily concentrated on crab harvesting and bark gathering (Interview with

Nazar, 2025). He also explained that menongkah activities are usually carried out at night when the sea water recedes, while during the day it is more used to look for crabs and barking activities. This illustrates that the use of tongkah is not only functionally flexible, but also adapts to the tidal dynamics of seawater and the behavior of the biota that are the target of the catch.

Tongkah is used mainly when seawater recedes because the thick muddy seabed conditions do not allow the use of boats. The shape of the tongkah resembles a 1.5–2 m surfboard made of light wood, usually island wood, because of its strong nature but still easily sliding on the mud surface. However, according to Mr. Nazar, currently, islandwood is becoming difficult to find due to logging of mangrove forests and environmental changes, so fishermen are forced to use other types of wood available around mangrove forests.

In addition to the variety of materials, there are also differences in the technique of using tongkah among the fishermen. Mr. Samit explained that there are two main ways to do it: standing and kneeling. The standing technique is considered faster in gliding, but it requires a high balance, especially in strong winds. On the other hand, the kneeling position is considered more stable and safer when the mud is too deep (Interview, Pak Samit, 2025). Mastery of squatting techniques, such as standing and kneeling positions, reflects the accumulation of skills acquired through social learning between generations. From the perspective of Human Capital Theory (Pyatt, 1966). This skill is a form of informal investment that increases the work capacity of fishers.

Furthermore, the practice of menongkah also shows the process of consciousnessization, as stated Scoones (1998) where local knowledge is not only technical but also strengthens collective awareness and community solidarity. Thus, fishermen's productivity comes not only from tools but also from a combination of skills, experience, and social values inherent in the practice.

4.2 The Effectiveness of Tongkah in Increasing Productivity

Most informants stated that the use of tongkah significantly increased work productivity and income. Tongkah is considered more efficient than other tools, such as canoes. The interview findings indicate that the use of a stick is considered more efficient and cost-effective compared to alternative methods, which may require investment costs amounting to millions, whereas the stick typically requires only hundreds of thousands of rupees. Furthermore, this method tends to yield higher catches, as it enables fishermen to access and operate directly within the muddy areas (Interview with Nazar, 2025). The same thing was conveyed by Mr. Samit, who emphasized that tongkah allows fishermen to reach fishing areas that cannot be passed by small boats, even though this activity requires considerable effort and time.

The interview findings indicate that the use of tongkah influences fishing yield, as it enables fishermen to access areas that cannot be reached by canoes. However, this method requires a considerable amount of time owing to its fully manual nature (Interview with Samit, 2025). The interview results indicate that the tongkah plays an important role in reducing operational costs while expanding the range of fishing areas. Economically, fishermen consider the use of tongkah to help them improve work efficiency, both in terms of time and resource management. These findings are in line with the theory of work productivity according to Mardiyani (2024) which states that productivity is influenced by the ability of the workforce to manage time, energy, and costs effectively. In the context of the Tembeling community, tongkah can be seen as a Symbol of Local Efficiency based on environmental wisdom and socio-ecological adaptation of coastal communities.

4.3 Social Values and Local Wisdom in the Use of Tongkah

In addition to its economic value, tongkah has strong social and cultural significance. Based on the results of the interviews, the fishermen said that tongkah has been used since the time of their ancestors and has been passed down through generations. Within the framework of local wisdom, the menongkah skill encompasses the ability to effectively use the tongkah board and shell-digging tools. These skills are acquired from an early age through intergenerational learning, as children observe their parents controlling the board over muddy surfaces, maintaining balance, and applying specific techniques to

dig for shellfish. The learning process occurs gradually, beginning with observation and imitation, and progressing toward independent mastery. This expertise is transmitted across generations and serves as a distinctive occupational identity of coastal communities, one that remains difficult to replace with modern technology ([Amin, Ayub, Muryanti, & Putridiani, 2025](#)).

The interview findings indicate that tongkah was inherited from previous generations, particularly from the community's ancestors. From an early age, members of the community have learned to practice and master its use, which has ultimately shaped tongkah as a defining element of the cultural identity of the Tembeling people (Interview with Samit, 2025). According to Mr. Saharul, tongkah has been used as a competition and was exhibited at a national event in Jakarta, indicating that it has been recognized as a traditional cultural heritage typical of Tembeling.

According to the interview with Saharul, tongkah has not only been practiced as a livelihood tool but has also been featured in competitive events and showcased at a national exhibition in Jakarta, Indonesia. This indicates that tongkah has gained recognition as a distinctive form of traditional cultural heritage originating in Tembeling (Interview with Saharul, 2025). From this narration, it can be seen that tongkah is not only a means of earning a living but also a symbol of the cultural identity of the coastal people of Tembeling. The recognition of tongkah at the national level shows that local communities have succeeded in maintaining local wisdom in the midst of modernization of marine fishing equipment.

From the perspective of local wisdom [Aida, Noor, and Yusrudin \(2022\)](#), Tongkah reflects the harmonious relationship between humans and the environment, where economic practices are carried out considering ecological boundaries. This explains why the barrel is still maintained despite the availability of other technological alternatives that are more modern but less suitable for the local context of the village.

4.4 Barriers and Challenges to the Sustainability of Tongkah Use

Although the barrel is still relevant to use, there are several factors that threaten its sustainability. According to Mr. Nazar, one of the biggest threats comes from marine reclamation plans and the construction of embankments that can change the conditions of coastal ecosystems. The interview findings revealed concerns regarding the planned construction of a sea barrier, which could potentially prevent local fishermen from continuing their primary livelihood at sea. For the community, marine-based activities constitute the main source of income, and such development poses a significant threat to their economic sustainability (Interview with Nazar, 2025).

In addition to development-related threats, natural factors, such as extreme weather conditions, represent substantial obstacles. Tongkah activities are particularly challenging during periods of strong winds or heavy rainfall, as the muddy surface becomes slippery and increases the risk of accidents. Furthermore, the interview results indicated that the use of tongkah becomes difficult under adverse weather conditions. Consequently, fishermen often postpone their activities until the weather conditions improve (Interview with Samit, 2025).

This condition shows that the sustainability of tongkah depends on environmental policies and natural factors. If reclamation or construction of sea embankments occurs, the mud ecosystem where the habitat of shellfish and shrimp lives will be disturbed, and the tradition of menongkah is threatened with extinction. Interestingly, the informants had different views on the future of the tongkah. Pak Nazar felt pessimistic, stating that the sustainability of the tongkah was still "gray" because of the plan to build a sea dam that could change the condition of the ecosystem. However, Mr. Samit and Mr. Saharul are optimistic that the tongkah remains relevant because it is an inseparable part of the life of the fishermen in Tembeling.

The interview findings indicate that tongkah is expected to remain in use, as it continues to serve as the primary livelihood for many fishermen, particularly those operating in dock areas where tongkah fishing activities are concentrated (Interview with Samit, 2025).

In addition, the interviews highlighted environmental concerns related to water flow. It was emphasized that any obstruction could disrupt natural water circulation, potentially affecting coastal and marine ecosystems (Interview with Saharul, 2025).

From these various views, it can be concluded that these results indicate that the sustainability of the use of tongkah is highly dependent on environmental policy and community adaptation to geographical changes. Theoretically, this is in line with the concept of the Sustainability Livelihood Framework [Scoones \(1998\)](#), which emphasizes the importance of the sustainability of local resources in supporting the livelihoods of traditional communities.

5. Conclusions

5.1 Conclusion

This study concludes that tongkah, as a traditional aid, plays a significant role in increasing the productivity of fishermen looking for sea shellfish in Tembeling Village, Bintan Regency. The use of tongkah boards made of island wood allows fishermen to speed up the search process, reduce operational costs, and expand access to fishing areas that cannot be reached by boats, especially in low tide conditions. These findings show that the increase in fishermen's productivity is not solely determined by technological modernization but also by the suitability of work tools to coastal environmental conditions.

However, the sustainability of tongkah faces challenges in the form of limited availability of island wood, environmental changes, extreme weather, and potential coastal management policies that can affect the continuity of this practice. Therefore, the sustainability of the tongkah is highly dependent on environmental support and policies that are sensitive to local practices and needs.

5.2 Research Limitations

Theoretically, the findings of this study reinforce the Sustainable Livelihoods Framework by demonstrating that tongkah functions as both a physical and social asset that supports the livelihood strategies of traditional fishers. Its existence not only enhances economic efficiency but also strengthens social capital through community solidarity and intergenerational transfer of local knowledge.

Furthermore, this study contributes to the development of Human Capital Theory by highlighting that menongkah skills represent a form of nonformal knowledge investment that enhances fishermen's work capacity and self-confidence. Overall, these findings affirm that traditional technologies can play a strategic role in strengthening human and social capital within the context of small-scale fisheries. Practically, the results of this study show the importance of supporting policies that favor the preservation of traditional fishing gear based on local wisdom. Local governments and stakeholders must ensure the sustainable availability of local raw materials, provide relevant skills training, and design coastal management policies that do not disturb fishermen's catch habitats. In addition, the integration of tongkah in small-scale fishery development programs can be an adaptive strategy to increase fishermen's productivity without sacrificing the sustainability of the coastal environment.

5.3 Suggestions and Directions for Future Research

This study has several limitations. First, the focus of the study was only on one location, namely Tembeling Village; therefore, the findings cannot be generalized to all coastal fishing communities. Second, the use of a descriptive qualitative approach makes the research results dependent on the interpretation of informants and researchers, even though the validity of the data was maintained through triangulation. Third, this study did not quantitatively measure the productivity of fishermen; therefore, the efficiency of tongkah use was not shown numerically. In addition, external factors such

as coastal development policies, climate change, and environmental degradation have not been analyzed in-depth.

Based on these limitations, further research is recommended to integrate qualitative and quantitative approaches to empirically measure fishers' productivity, including time efficiency, operational costs, and catches. In terms of policy, support for sustainable coastal management is needed, especially regarding the availability of raw materials for barrels and the development of alternative environmentally friendly materials.

The preservation of menongkah practices needs to be accompanied by adaptive innovation, training, and collaboration between the government, community, and educational institutions so that tongkah continues to function as a productive tool as well as the cultural heritage of coastal communities. Researchers are then advised to combine qualitative and quantitative approaches in order to be able to produce a more comprehensive analysis of the relationship between the use of *logs* and increased fishermen's productivity. Productivity measurements based on empirical data, such as work time efficiency, operational costs, and catch volume, would enrich the results of this descriptive study.

Acknowledgments

During the preparation of this article, the author received valuable support, constructive feedback and encouragement from various parties. The author would like to express sincere gratitude to Mrs. Nurhasanah, SE., M.Si., as the Lecturer in Charge of the Human Resource Management Seminar, for her guidance, direction, and motivation throughout the research process. Appreciation is also extended to the author's colleagues and friends for their continuous enthusiasm, assistance, and moral support during the completion of this study.

Author Contributions

The authors contributed to this study in the following ways. MT was responsible for conceptualization, study design, data collection, data analysis, and drafting of the manuscript. BSJ and FMI assisted with data collection and analysis and contributed to the interpretation of the findings. LAM and ZT were involved in manuscript drafting and critical revision to enhance the academic quality and clarity of the work. NN provided supervision, methodological guidance, and a final review of the manuscript. All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work, thereby ensuring its accuracy and integrity.

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